

CLAIMS

1. Method of making a module comprising:
 - providing a reusable carrier substrate, with the reusable carrier substrate being light transmissive in a frequency range;
 - providing a first electronic component;
 - adhering the first electronic component to the reusable carrier substrate with an adhesive that is able to be ablated by light in the frequency range;
 - fabricating an interconnect structure on the first electronic component to form the module; and
 - illuminating the reusable carrier substrate with the light in the frequency range, after fabricating the interconnect structure and after adhering the first electronic component, to ablate the adhesive to remove the module from the reusable carrier substrate to allow reuse of the reusable carrier substrate.
2. The method of claim 1 further comprising:
 - providing a second electronic component; and
 - adhering the second electronic component to the reusable carrier substrate with an adhesive that is able to be ablated by light in the frequency range.
3. The method of claim 2 with adhering the second electronic component comprising adhering the second electronic component with the adhesive used to adhere the first electronic component.
4. The method of claim 2 with providing the first electronic component comprising providing the first electronic component in the form of an integrated circuit.
5. The method of claim 4 with providing the second electronic component comprising providing the second electronic component in the form of an integrated circuit.
6. The method of claim 1 with providing the first electronic component comprising providing the first electronic component in the form of an integrated circuit.
7. The method of claim 1 with illuminating the reusable carrier substrate comprising illuminating the reusable carrier substrate to remove the module from the reusable carrier substrate with the module being free of a carrier substrate to allow for improved thermal characteristics.

8. The method of claim 1 with providing the reusable carrier substrate comprises providing the reusable carrier substrate having a first thermal expansion coefficient in a thermal expansion coefficient range, and with providing the first electronic component comprising providing the first electronic component having a second thermal expansion coefficient in the thermal expansion coefficient range.

9. The method of claim 1 with adhering the first electronic component comprising adhering the first electronic component to the reusable carrier substrate with the adhesive made from bisbenzocyclobutene.

10. The method of claim 1 with adhering the first electronic component comprising adhering the first electronic component by extruding the adhesive on the reusable carrier substrate.

11. The method of claim 1 with adhering the first electronic component comprising adhering the first electronic component by spinning the adhesive on the reusable carrier substrate.

12. The method of claim 1 with providing the reusable carrier substrate comprising providing the reusable carrier substrate made from glass.

13. The method of claim 1 with providing the reusable carrier substrate comprising providing the reusable carrier substrate made from quartz.

14. The method of claim 1 with providing the reusable carrier substrate comprising providing the reusable carrier substrate made from fused silica.

15. The method of claim 1 with fabricating the interconnect structure comprising fabricating the interconnect structure by laminating a dielectric material to the first electronic component.

16. The method of claim 1 with fabricating the interconnect structure comprising fabricating the interconnect structure by forming thin film interconnects to the first electronic component.

17. The method of claim 1 with fabricating the interconnect structure comprising fabricating the interconnect structure by forming a top bonding layer to connect to the first electronic component.

18. The method of claim 1 with fabricating the interconnect structure comprising fabricating the interconnect structure in the form of thin film interconnect to form a ground plane, a power plane, and a signal layer.

19. The method of claim 1 with fabricating the interconnect structure comprising fabricating the interconnect structure in the form of a dielectric and a conductor.

20. The method of claim 1 with fabricating the interconnect structure comprising fabricating the interconnect structure in the form of a dielectric and a conductor with the dielectric in the form of a polyimide.

21. The method of claim 1 with fabricating the interconnect structure comprising fabricating the interconnect structure in the form of a dielectric and a conductor, with the dielectric in the form of bisbenzocyclobutene.

22. The method of claim 1 further comprising preparing the module for further processing free of a carrier substrate.

23. The method of claim 1 with illuminating the reusable carrier substrate comprising illuminating the reusable carrier substrate with light in a 248 nm range.

24. The method of claim 1 with illuminating the reusable carrier substrate comprising illuminating the reusable carrier substrate with light in a 308 nm range.

25. The method of claim 1 with illuminating the reusable carrier substrate comprising illuminating the reusable carrier substrate with light from an excimer laser.

26. The method of claim 1 with providing a reusable carrier substrate comprising providing a reusable carrier substrate having alignment marks for alignment of the first electronic component.

27. The method of claim 1 further comprising providing a plurality of electronic components with at least one of the plurality of electronic components is connected to the first electronic component and at least one of the plurality of electronic components is not connected to the first electronic component.

28. The method of claim 27 further comprising separating the first electronic component and the at least one of the plurality of electronic components connected to the first electronic component from the at least one electronic component not connected to the first electronic component.

29. The method of claim 28 with the separating comprising etching the interconnect structure.

30. The method of claim 28 with separating comprising separating the first electronic component and the at least one of the plurality of electronic components connected to the first electronic component from the at least one electronic component

not connected to the first electronic component after illuminating the reusable carrier substrate with the light in the frequency range.

31. The method of claim 30 with the separating comprising cutting the interconnect structure.

32. Method of making a module with a heat spreader comprising:

providing a reusable carrier substrate, with the reusable carrier substrate being light transmissive in a frequency range;

providing a first electronic component;

adhering the first electronic component to the reusable carrier substrate with an adhesive that is able to be ablated by light in the frequency range;

fabricating an interconnect structure on the first electronic component to form the module;

illuminating the reusable carrier substrate with the light in the frequency range, after fabricating the interconnect structure and after adhering the first electronic component, to ablate the adhesive to remove the module from the reusable carrier substrate to allow reuse of the reusable carrier substrate; and

attaching a heat spreader to the module removed from reusable carrier substrate.